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## COMMUNICATIONS

### THE EYE IN LEPROSY

BY

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LONDON

IT is estimated that there are between 50 and 100 cases of leprosy in the British Isles to-day.

To meet the needs of these unfortunate victims there has been in existence near Chelmsford since 1914 a Home maintained by voluntary subscription, where some 14 of these patients remain in voluntary isolation—for the disease is not notifiable in this country—and are cared for by Dr. Pirrie and the Mother and Sisters of the Community of St. Giles.

It is my privilege to visit the Homes from time to time to advise on the ocular involvement which is such a striking clinical feature of the disease, and it occurred to me that an outline of this rare and characteristic ophthalmic picture, together with notes of some of the cases I have seen, might be of interest.

I would first remind you that leprosy is a chronic disease, produced by the bacillus leprae, and is characterised by granulomatous infiltrations which may affect predominantly either the skin and subcutaneous tissues or the peripheral nerves; as a result two types, nodular and nerve leprosy occur, though a combination of the two is very usual.

*Proportion of Ocular Involvement in Leprosy.*—With regard to the proportion of lepers who show ocular involvement there is wide variation in the reports of observers. On the one hand de Silva puts the figure as low as 20 per cent., while Rogers maintains the eye is affected in every case if the patient lives long enough, with which Pinkerton agrees. Of the 14 cases I have observed 10 have characteristic eye changes, some of an inconspicuous nature only to be noted satisfactorily with a slit-lamp, a fact which may have some bearing on the low figures reported by some surgeons. There is general agreement that the eye is involved late, and Chance says it is unusual until the disease has been established at least two years. The eye is said to be more vulnerable in nodular than in nerve leprosy, an observation which I have not been able to confirm as these cases were chiefly a mixed type. Men appear rather more liable than women to eye affections.

*The Eyebrows and Lids.*—Thickening of the supraciliary ridges with loss of the eyebrows is a very characteristic early sign of leprosy of any type and is seen in approximately two-thirds of all cases. Diffuse infiltration of the lids beginning in the intermarginal area, and nodules, which rarely attain large

FIG. 1.

An advanced case of leprosy showing diffuse infiltration and nodular formation in the eyebrow, lids and surrounding skin.

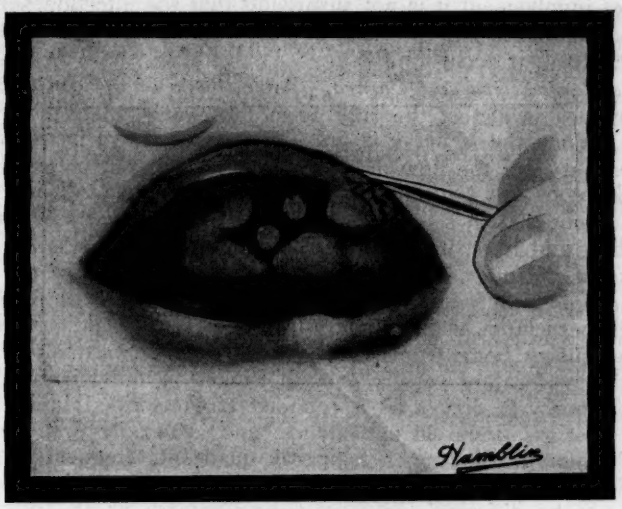

FIG. 2.

Same case as Fig. 1. Upper lid everted to show lepromatous infiltration of the tarsal plate.

size or ulcerate, are also common. This process may extend through the tarsal plate and be visible on the conjunctival surface (Figs. 1 and 2).

The eyelashes tend to become white and downy and to be shed early. In the nerve type anaesthetic patches, hairless and of different colour from the surrounding skin, are seen.

The infiltrated nodular lids tend to droop, and together with the thickened brows, ears, nose and lips are responsible for the characteristic leonine countenance.

*The Extra-Ocular Nerves.*—The terminal filaments of the VII nerve are commonly affected leading at first to diminished blinking, and later to irregular fibrillation of the orbicularis muscle, followed by paralysis with resulting ectropion of the lower lid. The III nerve is much less frequently involved, the ptosis commonly seen being, as I said before, usually a mechanical phenomenon. The IV and VI nerves seem always to escape. Wood considers the branches of the III nerve to the iris and ciliary body may also be affected, leading to a sluggish pupil and premature presbyopia.

*The Lacrymal Apparatus.*—The lacrymal gland may occasionally be the site of leprosy, and its palpebral portion require

excision as a result. Both the nose and eye being such common sites of involvement it is not surprising that the infection should spread frequently to the lacrymal sac and naso-lacrymal duct, leading to their occlusion.

*The Conjunctiva and Cornea.*—Anaesthesia of the conjunctiva and cornea is almost the rule when the eye is affected in any way. When the V nerve is first involved excessive lacrymation occurs but later the flow of tears ceases, leading to xerosis and shrinkage of the conjunctiva, not unlike trachoma. Elliot has pointed out that these changes are parallel to the early excessive sweating and later dry nature of the cutaneous patches.

One of the most characteristic changes in leprosy of the eye is the episcleral nodule at the limbus. This may apparently arise superficially, as a secondary infection from the lid, or deeply in the ciliary body from whence it spreads forward along the anterior perforating vessels, though Pinkerton and Kirwan deny the former. It occurs as a rounded circumscribed infiltration somewhat gelatinous in appearance, and is usually first seen at the limbus in the upper temporal quadrant, frequently symmetrical in the two eyes; its appearance is very distinctive though it has to be differentiated from spring catarrh or an episcleral

FIG. 3.

Generalised circumcorneal leprotic infiltration with two episcleral nodules. Leprotic pannus below.

growth. It tends to spread round the cornea, producing a characteristic loss of definition of the limbus, posteriorly into the conjunctiva and episclera, and anteriorly into the cornea. In the latter Bowman's membrane rapidly disappears, the substantia propria becomes infiltrated, and an anterior staphyloma may occur, though the central area of the cornea tends to remain clear till relatively late. Descemet's membrane is more resistant, though should it be destroyed perforation occurs and the eye is lost. The resulting corneal opacity becomes superficially vascularised leading to leprotic pannus, which is very like phlyctenular pannus and in no way characteristic (Fig. 3).

The distinctive primary change in the cornea is leprotic superficial keratitis, a bad term for the condition is not superficial and is quite unlike other types of superficial keratitis. It is the commonest, and often the only, eye change in leprosy, and its presence is pathognomonic. An idea of its frequency can be gathered from the fact that of the ten cases I have under observation at the Homes seven show this peculiar corneal involvement

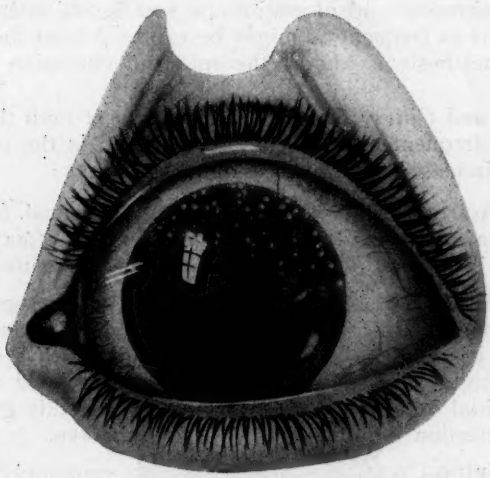

FIG. 4.

Superficial punctate keratitis of leprosy.

in unmistakable form either alone or together with other eye changes. The condition can only be observed satisfactorily with a slit-lamp when there is seen, spreading from the margin of the cornea in its upper half, a grayish milky appearance of the substantia propria, well-defined in extent, in which are scattered

numbers of white dots not unlike grains of chalk. The outline of these is irregular and they vary in size, the largest appearing under the slit-lamp about that of a small pin's head. At the limbus above the whole thickness of the substantia propria is involved, but traced centrally it tends to become more superficial—the whole being cuneiform in shape with the base of the wedge upwards. The overlying epithelium shows little change, and no vascularisation occurs. Pillat has pointed out that in apparently unaffected corneae of a patient with leprosy small nodules at irregular distances may be seen on the nerves; whereas, curiously enough, in an area of superficial keratitis the nerves are invariably normal. Unlike most manifestations of leprosy in the eye this condition of the cornea may disappear to a large extent under treatment. (Fig. 4.)

The other change seen in the cornea is a deep infiltration extending centrally from the periphery known as interstitial keratitis of leprosy. It occurs as a sequel to involvement of the ciliary body, though unlike interstitial keratitis of syphilis, the opacity does not tend to become less dense in the course of time.

Corneal abrasion and ulceration are seen occasionally, but are by no means as frequent as might be expected from the fact that corneal anaesthesia is almost the rule and entropion extremely common.

*The Iris and Ciliary Body.*—Inflammation of both these structures is of frequent occurence in leprosy and is the commonest cause of blindness. It may occur in several ways:

(*a*) ACUTE IRITIS, accompanied by the usual features of pain, injection, muddy iris, etc. This is not often seen, and differs in no way from the usual non-specific acute iritis.

(*b*) A LEPROTIC NODULE IN THE IRIS which, again, is uncommon and, in fact, denied by some. The nodule appears at the iris angle where it is in continuity with a similar infiltration of the ciliary body, and is associated with deep interstitial keratitis. As may be imagined this gross localised infection is highly destructive to the eye.

(*c*) IRIDO-CYCLITIS, which is far more commonly seen than either of the preceding, and is markedly insidious and chronic in its course. Not infrequently there are co-existing changes of superficial punctate keratitis. The eye is quiet, and the keratic precipitates tend to be non-pigmented and distributed over the whole of the posterior corneal surface rather than in the lower segment as is usually seen in cyclitis. In the iris are seen a number of grayish discrete spots, on some of which may be fine pigment particles, distributed irregularly

between the collarette and the ciliary zone; these are distinctive in appearance and pathognomonic of leprosy. Some observers regard these as points of exudate, others consider them as foci of leprotic infection; I have not been able to find any account of a pathological examination of the iris which might settle this point. Apart from these gray spots the iris may appear quite normal, or may be the site of chronic iritis, the feature of which is its tendency to produce atrophy and depigmentation of the stroma with few, if any, posterior synechiae. This atrophy is at times extreme, the whole structure appearing gray and flat, the normal vessels visible, the crypts lost, and holes appearing in the stroma. As might be expected a soft degenerate eye results, and secondary glaucoma is almost unknown.

Complicated cataract is frequent.

In considering this irido-cyclitis one is struck by the similarity to heterochromic cyclitis—there is the same quiet eye, scattered non-pigmented keratic precipitates, depigmentation of the iris and complicated cataract, though of course the gray spots in the iris are peculiar to leprosy. (Fig. 5.)

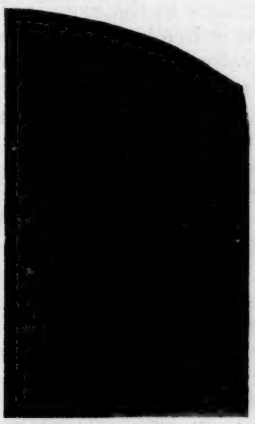

FIG. 5.

Specific gray spots in iris in a case of leprosy. No other evidence of iritis.

*The Fundus.*—There is some difference of opinion whether the retina and choroid, apart from local spread from the ciliary body, are ever affected by leprosy; though, of course, examination in

many advanced cases is impossible owing to corneal scarring and the results of iritis. The majority of observers state definitely that no change is ever seen in the fundus. Trantas, however, claims to have observed white dots and pigment proliferation in 68 per cent. of his cases, and Mancione to have discovered leprosy bacilli in the retina and choroid of 5 excised eyes.

*Discovery of Bacilli in Leprotic Eyes.*—It is notorious that lepra bacilli are present in vast numbers in leprotic lesions. They may be found readily in episcleral nodules, conjunctival secretions, scrapings of affected and, in some cases, of apparently normal corneae. They have also been demonstrated in the iris and ciliary body. No bacilli are present in the deep infiltrations of leprotic interstitial keratitis which are probably the result of toxins.

Apart from the 5 cases reported by Mancione, to which I referred above, there appears general agreement that the bacilli are not found in the choroid, retina, optic nerve, lens or vitreous.

*Treatment.*—Treatment must be considered under two headings—GENERAL and LOCAL.

Of the general treatment I will only say that it consists for the most part in the administration of chaulmoogra oil, usually in the form of the ethyl esters. Following these injections there are often severe focal reactions in the eye; initial doses must, therefore, be small when it is involved. Many substances have been injected subconjunctivally, among others bicyanide of mercury, ox gall, guiacol and trypan blue; their very number makes one sceptical, and I suspect Kirwan's statement that all subconjunctival medication is useless, is the truth. The most hopeful surgical procedure is excision of the episcleral nodule in the early stage, which often arrests the condition locally and prevents corneal opacification. Tarsorrhaphy must be done for exposure keratitis, peritomy may be tried for pannus, and an iridectomy for a secluded pupil, though any optical result from the latter is liable to be disappointing as the gap becomes filled by exudate. Extraction of complicated cataract in the late stages may help, and it is noteworthy that the eye in leprosy tolerates surgical interference extremely well; Pinkerton has reported 301 intraocular operations without a single case of post-operative infection.

In conclusion I would like to express to Dr. Pirrie, the Medical Officer in charge of the Homes, and to Dr. Cochrane, of the British Empire Leprosy Relief Association, my thanks for their advice and help.

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## THE INHERITANCE OF OPAQUE NERVE FIBRES IN THE RETINA (PAPILLA LEPORINA)

BY

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OPAQUE nerve fibres in the retina, though they are abnormal in man, occur as a normal condition in some mammals. Johnson says that they are present in some of the rodents, more particularly in the Leporidae and in some marsupials, such as *Perameles lagotis*. In the rabbit they form a transverse band stretching right across the retina, but do not become visible until ten days after birth, when medullation has taken place. Johnson gives beautiful coloured plates of the fundi of the rabbit and *P. lagotis*, the rabbit-eared perameles. Waardenburg states that they are present in the ox and dog, but this is not shown in

Johnson's plates nor is it mentioned in his text. In all mammals, in which they occur normally, they start at the disc and follow the course of the main arteries, and this is almost invariably the case in man also.

Medullated nerve fibres in man normally stop at the lamina cribrosa, and according to Berliner, when they are present in the retina, they are not continued through the lamina, but commence again independently in the retina. Medullation takes place from the centre towards the periphery and is completed last in the optic nerve. At birth the nerve fibres are not yet medullated either in the optic nerve or in the retina, and opaque nerve fibres are not seen until some months after birth. Berliner believes that myelin is laid down by the oligodendroglia, which in normal people is not present in the retina, and suggests that its presence in this unusual situation is the cause of opaque nerve fibres, but he gives no satisfactory proof of this.

They cause no symptoms in man, but the size of the blind spot may be increased, though not so much as might be expected from their extent, because in a thin layer they are transparent to light.

The defect is not a very rare one. In a table compiled by Kisô from various European sources they were found in 357 people out of 628,144 and in one compiled from Japanese sources in 9 out of 13,622, but these figures are not a true index of the incidence, because all were not examined with the ophthalmoscope. The incidence, however, cannot be lower than 1 in 1,759 in Europeans and 1 in 1,513 in Japanese, and may be a good deal higher. Kisô found the condition in 1 out of 659, in whom the fundi were described.

In most people they form a small patch spreading out from one quadrant of the disc, and seldom arise from its whole circumference, and only in 14 to 18 per cent. are they present in both eyes. According to Kölliker of 156 cases, 62 per cent. were in males and 38 per cent. in females, and the figures given by Terwelp are similar, for of 122 people, 66 per cent. were males and 34 per cent. females.

Opaque nerve fibres in the retina have been found in association with the following abnormalities—with a persistent hyaloid artery by Blascheck, Mayerweg, Bliedung, Fischer, and Terwelp, Fischer's patient having neurofibromatosis, and Terwelp's a polar cataract also; with congenital cataract by Kölliker, Menacho, Takada, and Tereschkowitsch, a coloboma of the optic nerve being present also in the last case, with a coloboma of the macula by v. Duyse and Clausen, Clausen's patient having a son with a similar coloboma, but no opaque nerve fibres; with a

coloboma of the choroid by Derby; with a coloboma of the choroid and iris by Schmidt-Rimpler and Hilbert; with a coloboma of the iris and an accessory pupil below in each eye by Strzeminski, and with a persistent pupillary membrane by Fleming, Assicot, Kohda, and Kraupa, Kraupa's patient having oxycephaly, imbecility, and myopia, 11D., in both eyes. I have seen a streak of opaque nerve fibres running from the upper part of the right disc along one of the main arteries in a boy of six with oxycephaly. Mayerweg has recorded the presence of opaque nerve fibres, a large angioma, and 10D. myopia in the same eye, and Eversbusch an abnormally developed disc with a large central scotoma, and Kono connective tissue at the disc and 20D. myopia in both eyes. They have also been found several times in association with an abnormal shape of the disc or with pigmentation of the disc. In most of these cases the opaque nerve fibres were extensive. It is, however, very doubtful whether their association with such developmental anomalies is more than a coincidence. Opaque nerve fibres are sufficiently common for such coincidences to happen, and not only are they more likely to be detected, when another more important defect is present, but are much more likely to be placed on record.

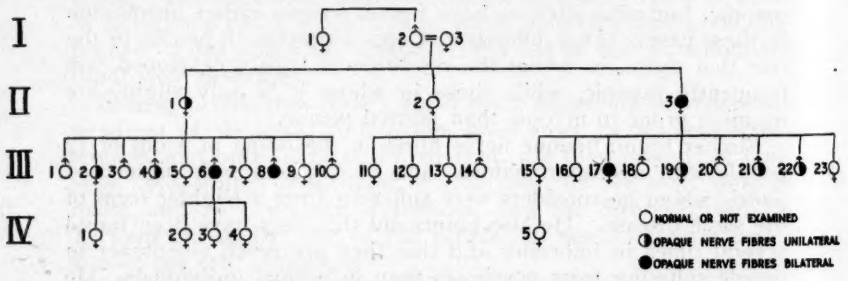
There may be a closer relation between myopia and opaque nerve fibres, for when these are unilateral myopia may be confined to the affected eye or may be of much greater degree in it. Berg and Degner found myopia above 5D. in 25 out of 40 patients with opaque nerve fibres and Kölliker says that 47·9 per cent. are myopic, but other authors have found myopia rather uncommon in these cases. This difference of opinion seems to be due to the fact that those, in whom the condition is highly developed, are frequently myopic, while those in whom it is only slight, are no more prone to myopia than normal people.

Fischer found opaque nerve fibres in the retina in 4 out of 12 people with neurofibromatosis, and in 4 others with pigmented naevi, whom he considers were suffering from a slighter form of the same disease. He also points out that they have been found several times in imbeciles and that they are much commoner in people suffering from psychoses than in normal individuals. He thinks that the presence of opaque nerve fibres in such cases is a sign of a widespread developmental defect of the central nervous system, and that even in apparently normal people it may be an indication of a more trifling defect in this situation. Before his conclusions can be accepted we must know the incidence of opaque nerve fibres in a much longer series of cases of neurofibromatosis, and its exact incidence amongst the general population.

There are few records of the inheritance of the condition. Mauthner records it in two sisters, and Meyer-Riemloh in a

mother and in her daughter, who also suffered from epilepsy and Leber's optic atrophy. The only pedigree of any length is that of a Japanese family published by Kisô, and reproduced by Kurzes Handbuch der Ophthalmologie, Komai, and Waardenburg. In this six individuals were affected in two generations and, with three exceptions, the descent was direct. In one of these a normal female transmitted it to her two surviving daughters, in another a normal female transmitted it to one son, four other sons and daughters being unaffected, and in the third a normal female transmitted it to a son, two other sons and a daughter being normal, and one son and four daughters not examined. Of the six affected three were males, in whom it was unilateral, and three were females, in one of whom it was unilateral and in two bilateral. In one female it was bilateral and very extensive, but in the other five it was slight.

In the early part of this year, 1936, I had a patient, Mrs. G., in my ward at the Middlesex Hospital suffering from arterial hypertension and coronary thrombosis with right branch bundle block. Opaque nerve fibres were present in the right eye, and the same abnormality was found in a sister and daughter. After much trouble all the available members of the family were examined, but it was not possible to find out whether they had any error of refraction. All appeared to be mentally normal, and there was no evidence that any had neurofibromatosis. With the exception of Mrs. G. none had any obvious defect of vision.




I—1. Female, aged 74 years. Incipient cataract; fundi difficult to examine, but no opaque nerve fibres seen.

I—2 and 3. Dead.

II—1. Mrs. G., aged 57 years. R.V. 6/60. L.V. 6/24. Myopic fundi worse on right side. (−3 D. Right, −1 D. Left eye. Ring of choroidal atrophy round disc on both sides. Some arteriosclerosis. Bundle of opaque nerve fibres spreading from inner and lower quadrant of right disc.

II—2. Mrs. R. Normal.

II—3. Mrs. W. Bilateral opaque nerve fibres. Large oval patch to upper and outer side of right disc, but not actually in contact with it. From the whole of the upper and outer quadrant of the left disc opaque nerve fibres run outwards for a short distance.

III—1. Albert G. Died aged five weeks.
III—2. Mrs. R. R., aged 38 years. Unilateral. Opaque nerve fibres at the upper border of the left disc.
III—3. Thomas G., aged 35 years. Single. Normal.
III—4. Albert G., aged 33 years. Married, no children. Unilateral. A broad splash of opaque nerve fibres arises from the upper and outer quadrant of the left disc.
III—5. Dolly G., aged 29 years. Single. Lives in France; not examined.
III—6. George G., aged 28 years. Bilateral. A small splash of opaque nerve fibres arises from upper and outer quadrant of right disc, and one arises from upper and outer and another from upper and inner quadrant of left disc.
III—7. Lily G. Died, aged thirteen weeks.
III—8. Frank G., aged 22 years. Single. Bilateral. A long streak follows a vessel from the upper and outer quadrant of the right disc, a small broad splash arises from the upper and outer quadrant of the left disc.
III—9. Maud G, aged 19 years. Married, no children. Normal.
III—10. James G., aged 16 years. Single. Normal.
III—11. Aged 37 years; III—12. Aged 35 years; III—13. Aged 33 years and III—14. Aged 28 years, refused to be examined.
III—15. Mrs. F., aged 35 years. Normal.
III—16. Mrs. At., aged 33 years. Normal.
III—17. Mrs. S., aged 31 years. Bilateral. A wedge-shaped area of opaque nerve fibres covers the outer third of the right disc, a small circular patch lies near the centre of the left disc.
III—18. Harry W., aged 29 years. Single. Normal.
III—19. Mrs. Ar., aged 23 years. Unilateral. A small patch of opaque nerve fibres arising from the left disc.
III—20. William W., aged 22 years. Normal.
III—21. Frederick W., aged 21 years. Unilateral. A patch of opaque nerve fibres extends for a short distance from the outer side of the left disc.
III—22. Frank W., aged 17 years. Unilateral. A broad splash of opaque nerve fibres runs for a short distance along a vessel arising from the upper and outer quadrant of the right disc.
III—23. Caroline W., aged 13 years. Normal.
IV—1. Renée R., aged 15 years. Refused to be examined.
IV—2. Female died of pneumonia aged nine days.
IV—3. Female, aged 5 years. Normal.
IV—4. Female, aged 9 weeks. Too young to show the defect.
IV—5. Female, aged 10 years. Normal.

Kisô thinks that the gene is in the X-chromosome and that the condition is sex-linked, on the grounds that no instance of transmission by a male occurred in his pedigree and that three females, who transmitted it, were themselves normal. He also points out that of Meyer-Riemloh's two patients the daughter had Leber's optic atrophy and that this is inherited as a sex-linked recessive in most European families. The last fact, however, affords no support to his view, because, if the optic atrophy had been a sex-linked recessive in this case, the daughter should have escaped. It is true that Waardenburg has published the pedigree of a family, in which a condition closely resembling Leber's optic atrophy was inherited as a sex-linked dominant, but in Meyer-Riemloh's case the mother was normal.

Sex-linked dominants show criss-cross inheritance. Half the

sons and half the daughters of an affected female have the defect and half are normal, but all the daughters of an affected male have the defect and all the sons are normal. Taking Kisô's pedigree into consideration, there are only two instances in which an affected male had children, and in one case the son and daughter were both normal and in the other the only child, a son, was normal. Thus there are too few sons of affected males to prove that males cannot transmit the condition to their sons.

If a defect is sex-linked and incompletely dominant, the effect of the gene for the abnormality in the X-chromosome may be suppressed in some of the females owing to the presence of the corresponding gene for normal development in the other X-chromosome. Thus there may be some females, who appear normal, but are capable of transmitting the defect, some of the daughters of affected males may also appear to be normal, and less than half the daughters of affected females may be affected. The abnormality is also likely to be less fully developed in females than in males.

It will be seen that, though Kisô's pedigree is compatible with the condition being sex-linked and incompletely dominant, no convincing instance of criss-cross inheritance occurs in it. The fact that one well-marked example occurred with five slight ones in the same family shows that both types are determined by the same gene. This is confirmed by the observation of Jäger in one case and Terwelp in two cases that opaque nerve fibres may be extensive in one eye and slight in the other eye in the same individual. If this is accepted one would expect slight cases to occur in females and well-marked ones to be commonest in males, but Kisô's figures show that this it not so. Of 43 cases, in which the opaque nerve fibres were extensive 20 were in males and 23 in females, and of 51, in which they were slight, 32 were in males and 19 in females. On the other hand the sex-ratio given by Kölliker and Terwelp, both of whom found twice as many males as females with the defect, is in favour of sex-linkage.

The opinion expressed in the Kurzes Handbuch der Ophthalmologie, based on Kisô's pedigree, is that opaque nerve fibres in the retina are determined by an autosomal gene, which is incompletely dominant. Komai says that the material is too limited to permit a decision as to the mode of inheritance.

In the pedigree published in this paper there are 10 affected members, in 4 of whom the condition is bilateral and in 6 unilateral, and in all of them the area covered by the opaque nerve fibres is small. Five males and 5 females are affected, and in two of each sex the condition is bilateral. Of those examined in the sibships containing affected members, 10, 5 males and 5 females, are affected and 10, 4 males and 6 females are normal. Thus the

ratio of affected to normal is 1 : 1, and descent is direct in every case. Males and females show the condition to an equal extent, and it is bilateral in the same number of females as of males, which is contrary to expectation, if it is sex-linked. It it true that there is no instance of the transmission of the abnormality by a male, but only one affected male has children, and only one of them is old enough to show the defect.

Though the pedigree does not disprove Kisô's hypothesis that the condition is sex-linked, its inheritance is quite in accord with that of an autosomal dominant, and, since autosomal dominants are common and sex-linked dominants are of extreme rarity in man, it is probable that opaque nerve fibres fall into the former rather than into the latter group. It is certain from Kisô's pedigree that the dominance is incomplete, and we have no idea what the appearance of the eyes would be in an individual homozygous for the defect.

I am indebted to Mr. R. Affleck Greeves for confirming the presence or absence of the abnormality in four of the patients, to my Registrar, Dr. E. H. Capel, for the great trouble he has taken to ensure the accuracy and, so far as possible, the completeness of the pedigree, and to Dr. A. Wilcox, Registrar, Dr. N. A. Buxton, and Dr. L. C. Bousfield for examining some of the patients.

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# RESULTS OF INTRA-OCULAR INOCULATION OF TRACHOMA

## (On the question of the "follicle-building agent" of von Szily)

BY

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## I

IN order to clarify the question of how far the appearance of typical lymph-follicles is the result of infection with the virus of trachoma and not merely the usual reaction of the conjunctiva to such, von Szily published a series of articles giving the results of his experiments in the intra-ocular and intracerebral inoculation of trachoma on rabbits, guinea-pigs, and chickens. The starting-point of his experiments was formed by the reflection that there is normally no lymphatic tissue in the interior of the eye and that, as in his experiments in inoculation in sympathetic ophthalmitis, the production of lymph-follicles in the interior of the eye would make the specificity of the reaction-product the more evident. He did indeed, in a series of intra-ocular inoculations with infectious material from human conjunctivitis trachomatosa, succeed in producing, when the inoculation took, a repeatedly typical and identical result: namely, the appearance of typical lymph-follicles with germinal centres and all the usual histological and cytological characteristics in the choroid and the corpus vitreum. The histological pictures so obtained agree in every way with the well-known appearance of the conjunctival follicle of trachoma and are therefore spoken of as true trachoma follicles by von Szily. Besides, as characteristic of the positive result, is considered the further development of the intra-ocular process—considerable neoformation of tissue in the corpus vitreum, spontaneous healing with cicatrization and new follicular outgrowths side by side, just as one is used to seeing in true trachoma. The end-result of the process is phthisis bulbi.

The specific reaction begins in three to four weeks, after the disappearance of the first inflammatory shock-reaction and the resorption of the primary injected substance. Good results are, therefore, not to be expected before two to three months. The anterior chamber of the eye does not take part in the process.

The fact that follicular development is entirely independent of the primary injected mass—which has already degenerated—allows

Dr. Rutishauser, of the Institute of Pathology, was so kind as to examine a series of sections with me, for which I express my sincere thanks to him here.

von Szily entirely to reject the assumption that the process might be a sort of cellular culture in the interior of the eye. Just so does he deny the possibility of an overgrowth from the entirely uninvolved anterior part of the bulb. These views are essentially supported, further, by the results of intracerebral inoculation of the trachoma virus, which always occurred without the accompaniment of the nervous tissue and always led to the follicular development on the inner surface between dura and arachnoid. As a whole his results point to a toxin which actively spreads and excites its typical reaction, lymph follicles, in all its sites of inoculation. A certain difference was noted, in so far as the follicle showed a tendency to formation in the neighbourhood of blood-vessels in the interior of the eye, whereas the meningeal follicle showed no such tendency, practically no relationship to the vessels.

According to von Szily, the pathogenesis of the follicle is such that at first nodules form at the site of inoculation of the virus; their cells undergo active mitotic division and become the germinal centre of the now freely-developing follicle. Since all his attempts at inoculation with non-trachomatous material led to entirely negative results—the results of the experimental inoculation of sympathetic ophthalmitis forming a certain exception, but differing characteristically in important points from the results in trachoma—and a clearly-defined causal agent of trachoma could not be shown, the aetiology of the process will be assumed to lie in a " follicle-building " or else in a " germinal-centre-building " agent.

## II

In several experiments we used as basic substance pieces cut from human trachomatous conjunctiva, which were finely ground up in a mortar with a little physiological salt-solution, according to the method of von Szily. After puncture of the anterior chamber, 0·1 c.c. of the resulting mixture was injected with a lying needle intravitreally into each of six eyes of four rabbits. According to our experience, one must be careful that the paracentesis is not made in the region of the limbus, but rather somewhat more corneal, as otherwise an annoying prolapse of the iris, which might jeopardize the result, can easily occur.

Of the six eyes enucleated at different intervals (between five and six weeks post injectionem) five gave an absolutely positive result, while the sixth showed changes not characteristic enough for us to count it with the positive cases.

As a whole, the findings of von Szily could be entirely confirmed, especially his finding that truly good and characteristic results could not be expected before the end of the second or during the third month.

The histopathological examination of the series of sections gave the following important results:—

*Choroid*. The younger the process is, that is the sooner after inoculation of the infective material, that the eye is examined the more characteristic the result is. However, even by the fifth week, in addition to the diffuse lymphocytic infiltration, quite typical follicles are found in the choroid as well as in the corpus vitreum. At this time the volume of the choroid is usually increased to several times its normal size, because of oedema as well as massive cellular infiltration. The vessels are often gapingly wide and empty, at other spots filled ad maximum; however, an intravascular increase in lymphocytes can practically never be discovered. The earliest appearing small follicles have an undoubtedly close relationship to the vessels (Fig. 1), which, however, does not necessarily mean that there is a primary relationship between those vessels and the origin of the follicles, but rather that the primary relationship might, to a certain degree, be purely to the structure or the wealth of vessels of the particular tissue. For the not too small collection of cells in the choroid, must have some relationship to its abundant blood-vessels, without having to admit *a priori* that these vessels have a special function in the origin of the follicles.

The *suprachoroid* shares to a large extent in the process, it is greatly swollen by an enormous oedema and its fibrous framework is extremely torn apart by the secondary progressive shrinkage (" Auflamellierung " of von Szily). We could not establish a special tendency towards the origin of follicles in the neighbourhood of the suprachoroid in our cases, which does not mean, however, that this tissue remained entirely untouched.

FIG. 1.

Primary follicle in the choroid. Suprachoroid extremely torn apart (auflamelliert). (Five weeks post injectionem.)

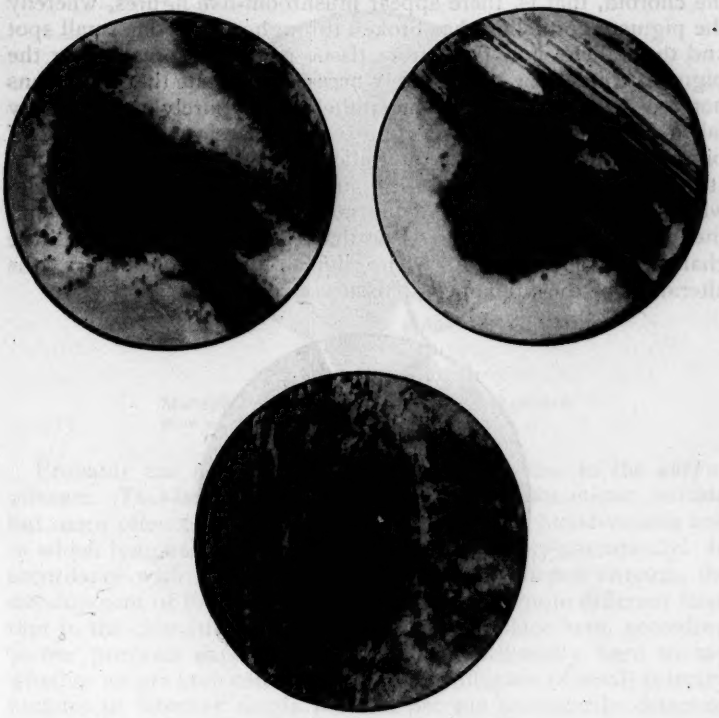

FIG. 2A—C.

Development of a follicle at the level of the pigment epithelium.

The *pigment epithelium* was also strongly affected by the extreme infiltration of the choroid. A far-reaching scattering of the pigment cells toward the bulb as well as the choroid takes place, which can at several points lead to a noticeable proliferation of these cells.

An impoverishment of pigment could nowhere be established—it can, however, be easily simulated by an oedematous swelling with displacement of the pigment to the borders. Should the enlarging follicle develop under the pigment epithelium, the result will be not only an outpocketing of the latter but also gradual rarification and, as end-stage, degeneration of the pigment epithelium so that the follicle, about ready to perforate the interior of the bulb, will be covered merely by the intact capsule of the corpus vitreum. At other places there can result such appearances as we see from time to time in the case of the rupture of an uveal sarcoma through

the choroid, that is, there appear mushroom-like figures, whereby the pigment epithelium has broken through at only one small spot and the follicle, now freed from tissue pressure, spreads over the pigment epithelium. It is barely necessary to state that it happens not too seldom that pigment epithelium is purely mechanically taken along at the time of rupture and therefore the finding of pigment epithelium within the follicle is not especially surprising. It is worth while to note that it is just the choroidal initial follicles which prefer to originate in the neighbourhood of pigment epithelium, in a surrounding tissue that is barely or relatively little changed, whereas there, where diffuse infiltration occurs, the alteration of the fundamental tissue is very great.

FIG. 3.

Primary follicle in the corpus vitreum; cicatricial tissue.

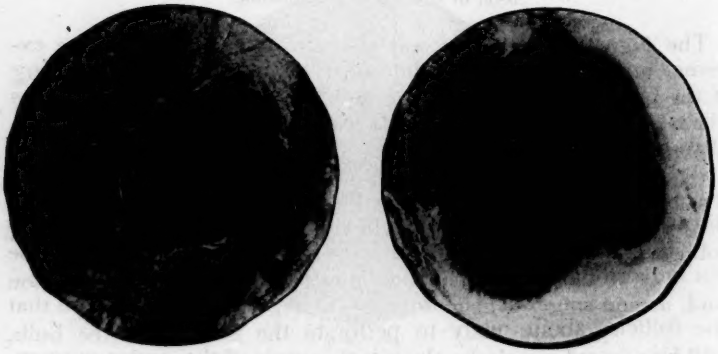

FIG. 4A and B.

Giant follicle in the corpus vitreum, tendency to confluence.

FIG. 4C.

Multiple formation germinal centres (Figs. 2–4, nine weeks post injectionem).

Probably the most striking changes take place in the *corpus vitreum*. This becomes more or less intensely a sometimes delicate but more often coarse cicatricial tissue, rich in blood-vessels and in which lymphatic tissue develops extraordinarily abundantly. In accordance with the lack of structure of the corpus vitreum, the development of the lymphoid tissue therein is quite different from that in the choroid. A diffuse growth takes place here, according to our previous experiments. It is extraordinarily hard to say whether we are here confronted with a confluence of small primary nodules or whether single follicles become secondarily detached from the diffuse mass (daughter-nodules). One thing, however, is quite definite; at the time of the most active lymphoid growth, there is, in the neighbourhood of the original injection-canal, no or practically no sign left of the original injection-mass. In general the only sign of it is the tissue dèbris which stains badly. Especially noteworthy is the behaviour of the light spots in the lymphoid tissue of the so-called germinal centres. While their appearance in the choroidal follicles is related only to the well-defined typical nodules, set off from the diffuse infiltration, we see them appearing, on the contrary, quite irregularly in the interior of the lymphatic cell-masses. It is quite probable that we can assume these germinal centres to be the primary sites of inoculation (von Szily) and that the development of the lymphoid follicles occurs concentrically to them. We can perhaps assume a confirmation of this view in the fact that the most greatly developed and typical germinal centres are on the periphery of the lymphatic masses, whereas they become smaller (younger?) the more they approach the centre. The older the structures in the corpus vitreum become the greater do they tend to discard the

original more or less constant globule for a long-oval shape, whose curve approaches more and more the posteriorly convex posterior lenticular surface, aided by a corresponding arrangement of the connective tissue fibres of the vitreal cicatricial tissue.

Besides these specific changes in the eye tissue, the probably unspecific reaction of the *retina* is of considerable interest. While there is practically never any follicular formation in the nervous

FIG. 5.

(Transient) iris nodule in *living* rabbit-eye.

A FIG. 6. B

Follicular formation in the choroid and corpus vitreum following inoculation with material from conjunctivitis vernalis (eight weeks post injectionem).

substance, the retina, in so far as it does not totally degenerate in the lymphatic proliferative process, responds to the development of these neoformations with a growth of its non-ganglionic elements that crosses over all borders. In other words, the result here is a true gliomatous neoformation conditional upon inflammation, since the proliferating retinal elements are composed almost entirely of spongioblasts. Mitoses are copiously met in this tissue. A second point is worth mentioning: where the lymphoid tissue comes in direct contact with the retinal elements, the latter take up very fine punctal granules, distributed in the protoplasm and forming groups here and there. Whether these granules have any relation to the inclusions of Prowaczek-Halberstaedter must be left undecided for the moment; in this connection overstraining of the sections after the method of Giemsa-Romanowsky gave no noticeable result which under the present conditions must therefore be considered negative.

The anterior portion of the globe, that is the iris, cornea, and anterior chamber, remained unaffected in all our cases. It must not be left unmentioned that we regularly found a diffuse nodular formation in the iris of the living eye; these nodules, however, disappeared just as regularly during the third week, without leaving any traces in the living eye or the histological section. It is probably a matter of local oedema irregularly distributed over the iris-tissue, which possibly has some connection with the regional swellings of the ciliary body. (Herrmann and Kiewe described in another connection, more or less transitory ciliary oedema, which could lead to a partial flattening of the anterior chamber.) A linear interstitial keratitis found in some eyes, may be considered traumatic, since no traces of nodular formation could be discovered. A certain tendency to nodular formation in the neighbourhood of the angle of the iris cannot forthwith be compared to the specific reaction-products, as we meet them in the interior of the eye, since the rabbit-eye responds to a whole series of entirely heterological interventions completely unspecifically with an angular lymphocytic outpouring that remains local. How far single perivascular collections of round cells found in the eye-muscles, have a specific aetiology, must for the present remain undecided until we have more material.

## III

The origin of the material and histo-cytological characterization of the experimentally produced intra-ocular neoformations leave hardly any doubt that we are concerned here with true lymph-follicles and in the special case with trachoma-follicles. The claim made by von Szily that the so-called germinal centres were specially rich in mitoses, could not be confirmed. In our

cases only quite isolated mitoses could be shown in addition to the mainly polynuclear leucocytes and so-called microcytes, whose relations to the mitoses are not quite clear (von Albertini). Nor could we find a fibrous structure in the interior of the follicles. In older cases there is indeed a certain tendency for the connective tissue to lie on the surface of the follicle in concentric layers of fibres (that is, a sort of capsule formation), without our being able however to find any formation of radial fibres above the highest cellular layers of lymphocytes or a framework reticulum. In order to study this point more closely we used a silver-impregnation method of Bielschowsky in addition to van Gieson's stain, which could but confirm our previous negative result.

The question of the origin of the leucocytes was unequivocally decided by von Szily in favour of their derivation from the choroidal system of blood-vessels. We have already taken the opportunity above of casting certain doubts upon the tenability of the view as far as the choroid is concerned and we believe that these doubts must be further emphasized in view of the tremendous development of lymphoid tissue in the corpus vitreum. The capillary neoformation in the vitreal cicatricial tissue which he so strongly emphasizes seems to be quite insufficient. Since it is unquestionably a progressive process, although we find the vessel-lumina practically free of lymphocytes, we must consider both lymphocytes derived *in loco* from histocytic elements (cicatricial tissue) and to a certain extent a sort of distant chemotactical influence of the inoculated " virus." With this last view could be reconciled the appearance of follicles in the meninges of guinea-pigs as noted by von Szily. Further in accordance therewith would be often the appearance of multiple peripheral germinal centres in diffuse lymphoid corpus vitreum tissue just behind the lens, that is at foci where the existing connective tissue is minimal or even absent and visible blood-vessels are practically non-existent. Agreeing with von Szily we reject as improbable and unsupported the view that the whole process might be a sort of intravitreal cell-culture, especially in view of the fact that the originally inoculated material is practically destroyed and the actual pathognomonic process begins only after several weeks and then is progredient.

We would prefer not to decide the question of the *specificity* as unrestrictedly as von Szily who categorically affirmed it, because of the negative results of his controls. Of course our experiments also support the thesis that by inoculation of undoubted trachomatous material from human conjunctivitis the changes found in the animal experiments are to be considered typical trachoma-follicles. On the other hand, we are in possession of an undoubtedly positive case of true lymph-follicle formation in

the uvea and corpus vitreum of the rabbit, after inoculation of material from human conjunctivitis vernalis. Since further experiments with other types of material are being pursued, we should prefer not to hazard any further opinion on this question for the moment, but rather to await later publication, should the results warrant it. However, it seems just, even now, to question the absolute specificity of the described findings for trachoma and, with certain modifications, for sympathetic ophthalmitis. We are, as is von Szily, far from taking as the result of our experiments a " unitarian " standpoint in regard to the supposed agent of the disease in question ; we believe, however, that the zone of influence of the " follicle-building " or " germinal-centre-building " agent will have to be widened.

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## ABSTRACTS

## I.—ANATOMY AND PHYSIOLOGY

(1) **Stilo (Messina).—The development and anatomical relations of the fascia of the orbit in man. (Contributo allo studio dello evoluzione della fascia del bulbo oculare nell'uomo).** *Rass. Ital. d'Ottal.*, January-February, 1935.

(1) **Stilo** has examined the developing orbital fascia in foetuses of various ages and in children as well as in the adult. In the earliest foetus examined (46 mm.), he states that between the walls of the orbit and the eye there is abundant mesodermal tissue, which represents a continuation of the intra-cranial perimeningeal tissue. This has all the appearances of embryonic connective tissue. It is specially dense in the neighbourhood of the orbital walls, the sheath of the optic nerve and the separate muscles and around the eye. There is no sign of orbital fat.

The outer part becomes attached and forms part of the periosteum of the orbit, the part round the optic nerve forms the outer layer of the dural sheath, and the part in the region of the globe becomes Tenon's capsule and the supporting fasciae of the

several structures. In the space between, the peri-meningeal tissue is converted into fat, which serves to support the eye in its normal position.

HAROLD GRIMSDALE.

(2) **Biffis (Padua).—The curvature of the anterior part of the sclerotic. (Contributo alla conoscenza della curvatura della sclera nel segmento anteriore dell'occhio).** *Ann. di Ottal.*, January, 1935.

(2) With the increased use of contact lenses, a knowledge of the true form of the sclerotic in the neighbourhood of the cornea has become very desirable. It is not possible to calculate the curvature from the reflex, as it is in the case of the cornea. **Biffis** has attempted to work it out by examination of enucleated eyes after death; he finds that there is no regular curve in the eyes that he has examined (but inasmuch as he kept the eyes for some time in formalin before making the measurements, it seems doubtful whether the shape would be preserved unaltered.)

HAROLD GRIMSDALE.

(3) **Marchesini (Genoa).—Changes in the scleral canals for the venae vorticosae at increasing ages. (Il comportamento dei canali sclerali e loro rapporti colle vene vorticosae nelle varie eta).** *Ann. di Ottal.*, September, 1935.

(3) It has been known for a long time that the sclerotic changed in character with advancing years; in youth the eye, if divided by an equatorial section, collapses when the vitreous is removed; in old age, it retains its hemispherical form. Examining a number of eyes of subjects of different ages, **Marchesini** finds that in youth the walls of the vorticose veins are separated from the surrounding sclera by a sleeve of loose connective tissue, and the veins are collapsed; as age advances this sheath of connective tissue becomes less and less and finally disappears. The vein is kept open by its close connection with the hard sclera, which seems specially dense in this region, in most old people.

HAROLD GRIMSDALE.

(4) **Rossi and Mocchi (Pavia).—Observations on the nerves of the iris and ciliary body. (Observazioni sui nervi del corpo ciliare e dell'iride).** *Ann. di Ottal.*, October, 1935.

(4) The nerves of the ciliary body and iris have been examined by many, but their arrangement is still not certainly known. The authors **Rossi** and **Mocchi**, have selected for this study, the eyes of albino rats; the absence of pigment simplifies the microscopical examination. They find that two kinds of nerve

fibres reach the ciliary body from the choroid; the first are some large bundles which run a straight course through the choroid without giving any branches of importance thereto.

At the region of the ciliary body they give off very numerous twigs which form a dense plexus, called by the authors the annular plexus. Some large bundles pass beyond the ciliary body direct to the iris.

A second set of nerve fibres come in great numbers from the peri-vascular plexuses of the choroid, and join the annular plexus; relatively few filaments follow the capillary blood vessels.

The authors draw the following conclusions from their observations: (1) the greater part of the very abundant nerve fibres of the ciliary body and iris break up into a diffuse rete which is probably sensitive in function.

(2) In the ciliary processes there is great development of peri-vascular plexuses; it is probable that this has to do with the secretion of the aqueous humour.

(3) The peri-vascular nerves of the iris do not form plexuses and do not appear to have the close connection with the vessels, of vasomotor nerves.

(4) In the iris there is a superficial rete, which is probably sensitive, and a second rete occupying the region of the sphincter pupillae which seems to be motor in function.

HAROLD GRIMSDALE.

(5) **Rapisada (Catania).—The effect of fatigue on certain functions of the eye. (Sul comportamento del diametro pupillare, dell'ampiezza di accomodazione e della tensione endoculare in soggetti affaticati).** *Boll. d'Ocul.*, April, 1936.

(5) The eye in sport has been the subject of many papers but not much has been written on the subject of fatigue and the resultant changes in the eye. **Rapisada** has examined the pupil size, the extent of accommodation, and the intra-ocular pressure in subjects who have undergone measured tasks; and has compared the results in trained and untrained. The means used to produce fatigue were (1) a rowing machine and (2) an apparatus for lifting a known weight to a known height. The examinee stopped as he felt tired and his reactions were taken. The author finds that almost constantly the intra-ocular pressure is lowered; the loss being greater in the untrained. The pupil is larger after fatigue; the increase being similar for both groups and the loss of accommodative power is also almost equal.

As to the causation of these changes, he thinks the change in the size of the pupil to be due to some irritation of the sympathetic, acting either directly on the dilatator or by constriction of the vessels of the iris. The loss of accommodation he attributes

to the action of the products of the excessive muscular action; and the fall in the intra-ocular pressure to the ischaemia of the tissues of the globe, consequent on the increased bloodflow to the active muscles.

HAROLD GRIMSDALE.

## II.—CORNEA

(1) **Tudor Thomas, J. W. (Cardiff).—Transplantation of the cornea.** *Irish Jl. of Med. Sci.*, July, 1936.

(1) In the Prentice Montgomery Lecture at Trinity College, Dublin, April 23, 1936, **Tudor Thomas** gives a brief summary of the history of corneal grafting and describes at length the experimental work which he has done during the past 14 years. After eight years' experimental work he proceeded to apply the results to the human being.

During the past six years he has done 36 operations for corneal transplantation, of which 24 operations were done on 21 suitable eyes.

Seven cases are briefly described, three were suitable cases, one, a favourable case, one, an amblyopic eye, and one an unfavourable case.

The following is his brief statement of results.

" To date I have done 36 operations for corneal transplantation, of which 24 operations were performed on 21 suitable eyes. I do not propose to detail the results on the unfavourable eyes, except to say that in only one case did the graft fail to unite, and no eye was lost.

The period covered by these operations is a period of more than five years, and the most recent of the suitable cases was operated on nearly three months ago. In every case the graft united.

Eighty per cent. of the patients benefited by the operation, and 28 per cent. were clear with vision of 6/36 or better.

Seventy per cent. of the operations were successful, and 25 per cent. resulted in clear grafts. The best result, as stated above, was a patient who became able to read 6/9 partly and Jaeger 1.

It is necessary to point out that my cases were not chosen especially with a view to obtaining the best statistical results, but were taken as they came, when there seemed to be some chance of improvement by the operation."

It is his opinion that the future will hold some chance of improvement for many cases that are, for various reasons, classified as unfavourable. His researches are being continued.

R. R. J.

(2) **Fiore (Naples).—Conical cornea complicated by (1) cataract and (2) glaucoma. (Su alcuni casi di cheratocono complicati rispettivamente con cataratta senile a con glaucoma cronico semplice).** *Boll. d'Ocul.*, April, 1936.

(2) Since von Szily in 1928 drew attention to the rarity of these complications in conical cornea, a few cases have been recorded; **Fiore** adds two of cataract, which were successfully operated on; he draws attention to the need of a good conjunctival flap in these cases; if this is made, the prognosis is good for operation.

Glaucoma is an even rarer complication. In the author's case one eye was blind and the other had a contracted field and vision of 6/24. The anterior chambers were deep, T.=40 mm. Hg. There seemed no doubt that the conical cornea had existed for many years and that the glaucoma was a recent addition. Unfortunately, as the patient was lost sight of, after the first visit, at which pilocarpine was prescribed, the final result is not recorded. The author thinks it certain that the two conditions were entirely unconnected in origin.

HAROLD GRIMSDALE.

(3) **Puglisi-Duranti (Bologna).—Krukenberg's spindle. (Pigmentazione a fuso della faccia posteriore della cornea).** *Arch. di Ottal.*, May-June, 1935.

(3) **Puglusi-Duranti** publishes notes of three cases of this condition, two of whom were hypermetropes. As a result of his observations with the slit-lamp, he thinks he has proved the effective cause to be an alteration of the endothelium of Descemet's membrane. The disturbance of the pigment he considers a normal process of old age and of myopia.

HAROLD GRIMSDALE.

## III.—CATARACT

(1) **von Bahr, G. (Copenhagen).—Studies of the aetiology and pathogenesis of cataracta zonularis.** *Acta Ophthal.*, Supplementum XI.

(1) **von Bahr's** thesis is devoted to a theoretical discussion on the pathogenesis of lamellar cataract, and to laboratory experiments aiming to clear up some of the outstanding points. The view that lamellar cataract is congenital in origin (the clear peripheral part representing post natal fibres) represents a difficulty in that the lamellar cataract may be larger than the whole of the

lens of the new born. On the other hand the occurrence of hereditary forms questions the significance of extraneous factors in the production of this form of cataract. This underlying conflict of views is indeed old, and as early as the eighteenth century a sort of compromise theory was advanced suggesting that lamellar cataract was caused by eclampsia in the mother. That this belief was not altogether unwarranted is shown by the author's own work. He was able to induce lamellar cataract in young rats if the diet was such that the animals were not only rickety but also developed tetany, either manifest or latent. Rickets in itself has no such effect. On the strength of much careful work he argues that hypocalcaemia is an essential factor in the production of experimental lamellar cataract, and he leaves the exact relationship to lamellar cataract in man an open problem. The treatise contains an excellent review of the literature on the subject and a full bibliography.

ARNOLD SORSBY.

(2) **Mura (Cagliari).—The aetiology of senile cataract. (Contributo allo studio dell'eziologia della cataratta senile).** *Boll. d'Ocul.*, April, 1935.

(2) The real cause of senile cataract is still to seek; **Mura** has made detailed examination of twenty-two cases; his conclusions are negative; (1) that cataract does not depend on the age of the patient, neither on the blood pressure nor the intra-ocular pressure; (2) that it has no dependence on the glycaemia ratio nor (3) on the uraemic content, finally (4) the calcium-potassium ratio is seldom far from normal.

All these factors may therefore be excluded. It is impossible, however, to exclude a relation between cataract and disturbance of the general endocrine system, and the author thinks that special influence is exerted by the thyroid, the pituitary and the suprarenals which are known to regulate the involution of old age. Though he mentions in the body of the paper the probable importance of the parathyroids, the author does not name them in his conclusions.

HAROLD GRIMSDALE.

## IV.—GLAUCOMA

(1) **Miloro (Genoa).—Doryl in glaucoma. (L'azione del doryl nella cura del glaucoma).** *Ann. di Ottal.*, October, 1935.

(1) The advantages of a drug that will lower the tension in glaucoma and enable the surgeon to postpone operation, even

temporarily, are obvious; eserine and pilocarpine, valuable though they are, are not always well borne. The search for other and more efficient agents has brought to the market several preparations. Redslob, in 1930 drew attention to the effect of choline and acetylcholine in reducing the tension in glaucoma. Recently a new ether of choline has been prepared from the interaction of choline and carbamminic acid, and put on sale under the name of "Doryl." **Miloro** reports the results of experiments made by him with this drug; he finds it to be both a miotic and able to reduce intra-ocular tension; it is not to any great degree superior to the older miotics, but it seems to be less irritating, and therefore can replace eserine and pilocarpine when these are badly tolerated.

HAROLD GRIMSDALE.

(2) **Ciotola (Naples). — The mean arterial pressure and the venous pressure in glaucoma. (Ricerche sullo stato vascolare dei glaucomatosi con particolare riguardo alla pressione arteriosa media e dalla pressione venosa).** *Rass. Ital. d'Ottal.*, January-February, 1936.

(2) **Ciotola** has compared the pressure in the veins of glaucomatous patients and the arterial pressure with that of normal subjects of the same age. He finds that the venous pressure is raised in almost all the cases of glaucoma, and that the mean and maximal arterial pressures also are often raised, the minimal pressure being usually about normal.

HAROLD GRIMSDALE.

## V.—MISCELLANEOUS

(1) **Lavery, F. S. (Dublin).—Ophthalmology in aviation.** *Irish Jl. of Med. Sci.*, July, 1936.

(1) An interesting paper by **Lavery** discusses the more important features of ophthalmology in aviation. He says: "the presence of hypermetropia above a certain degree is a danger. The continued effort to focus is apt to induce spasm of the ciliary muscle and of the internal recti. This tonic action produces error of judgment of distance in flying. In addition, under the effects of high altitude, loss of accommodation is likely to occur, so that the pilot cannot see his instruments clearly, and he is also liable to make a bad landing."

An Air Force machine of modern type has an air speed of about 220 miles an hour, while the landing speed with full margin of safety is somewhere in the region of 70-80 miles an hour. Immediately the plane loses touch with the ground the beginner

loses the one known definite quantity necessary in the judgment of distance to which he has always been accustomed, namely, contact with the ground. All verticals are more or less foreshortened and the size of known objects will be varied from that of previous experience, and, the speed at which the pilot is travelling is greater than any he has hitherto known.

"Imagine that you are in a plane by yourself for the first time, and that at last the problem of safe landing has to be faced. I can hardly imagine a more perfect subject for a nightmare! You circle round the landing-ground to note from the ground indicator the direction of the wind. Having brought the plane round until it is facing into the wind you throttle back the engine and, shoving the stick forward, begin the long downward glide. The comforting noise of the engine is stilled now, and you can hear the noise of the stays whistling in the wind. You are looking downwards in a slanting fashion upon objects that previously have been regarded from below. There is thus produced an unfamiliar foreshortening and tilting of vertical structures. You are approaching at anything from 75 to 95 miles per hour, and the ground beneath you is fast-moving, but appears almost at rest around the landing-point for which you are making. As the machine sinks the country on each side appears as if rising, so the effect is as though you were dropping into a bowl. You have got safely over the high hedge bordering the landing-ground, and flatten out in order to make a perfect landing. There is a rush of ground below, and objects suddenly assume the position of your normal experience. So far so good—but now the crucial test is to come. All your friends are standing around the hangar watching—ready to applaud or jeer! Personally, I wouldn't care what happened so long as I didn't break my neck! In order to land correctly, the machine should be allowed to sink down the last few feet so that the rear wheel, or skid, hits the ground shortly after the front wheels, making what is called technically a "three point landing." It is the judgment of these last few feet that is so difficult. The exophoric, thinking that he is nearer the ground than he actually is, flattens out his gliding angle too soon, with the result that gravity—the vertical component of the parallelogram of forces which is producing his diagonal glide—will take the upper hand. If his landing-speed is low, he pancakes on to the ground, while if he is landing at a high speed he is in grave danger of over-shooting the boundaries of the aerodrome. On the other hand, the esophoric, thinking that he is further away from the ground than he actually is, tends to fly into it, and stands his machine on its nose."

The author next describes and discusses some of the tests for ocular muscle imbalance which Air Force candidates have to pass.

"A man with good flying record may suddenly become a bad lander and have one or more crashes. He is sent up for investigation." Before resuming flying it is necessary that normal muscle balance should be restored.

After a rest he is put on to muscle balance training. In these cases the orthoptic training is carried out in the reverse order to that which obtains in a case of strabismus. Training is started with cards that demand the third degree of fusion and when a good amplitude has been obtained they are trained with cards which demand second and first degrees respectively. "They are not suffering from any fusional difficulty and it is, therefore, easier for them to maintain fusion with the third degree cards, and most difficult with those of the first degree. It is not until they have obtained good amplitude with the first degree cards that they are passed as fit for flying." With regard to uni-ocular aviators, such people do exist, but the author has no doubt that such are flying at a great disadvantage.

The paper ends with a note insisting on the importance of full fields of vision and enters into the question of flying at night; it will repay perusal in the original.

R. R. J.

(2) **Woods, A. C. (Baltimore).—Sympathetic ophthalmia.** *Amer. Jl. Ophthal.*, Vol. XIX, pp. 9-15, and 100-109, 1936.

(2) **Woods** gives a well balanced survey of the clinical features, pathology, treatment and prognosis of sympathetic ophthalmitis. Such statistics as he gives in this paper are based on 139 carefully reported cases by Fuchs (35), Joy (41), Verhoeff (35), and 28 of his own. The figures given for the probable incidence of sympathetic ophthalmitis after a perforating wound vary from 0·54 per cent. to 5 per cent. The disease appears to be more common after 50 years of age, an age at which intra-ocular operations are commoner than earlier in life but when accidental wounds are probably less frequent. Twenty-eight per cent. of the cases collected by the author were over 50 years of age. Penetrating wounds afford 63·3 per cent. and intra-ocular operations 23·9 per cent. of the cases of sympathetic ophthalmitis. The author refers to Joy's observation about the violence of sympathetic ophthalmitis after cataract extraction. Four cases of sympathetic ophthalmitis are recorded as occurring after simple contusion of the globe, two after subconjunctival rupture and 30 after a disintegrating intra-ocular new growth. Suppuration in an injured eye is not an absolute protection against sympathetic ophthalmitis. The author has seen one case and Schirmet reports two where this occurred.

Sympathetic ophthalmitis may follow a perforating wound that

is apparently healing without complications. An eye with an indolent long drawn out uveitis with occasional exacerbations leading to phthisis bulbi and recurrent ciliary pain is to be particularly feared.

The interval between the injury to the exciting eye and the onset of sympathetic ophthalmitis varies from 9 days to 48 years according to case reports in the literature. Sixty-four per cent. occur under two months and 90 per cent. in less than one year. Three months after the injury the chances of sympathetic ophthalmitis developing rapidly decline, althought it is possible for it to occur one year after the injury, it is a rarity.

Among the clinical features of this disease the following are described in some detail by the author. Rigidity of the iris which becomes thickened and has large flat nodules in its central and inner portions. Extensive posterior synechiae confluent with the anterior lens capsule and traversed by small capillaries passing on to it from the iris. The uveal tract becomes converted into a rigid mass, in which there is massive, intermittent and progressive cellular reaction in contrast to the low intensity of the inflammatory reaction.

The author describes the presence of " Dalen Fuchs " nodules of proliferated pigment epithelial cells undergoing autolysis, phagocytosis and infiltration by epithelioid and giant cells.

In the local treatment of the disease the importance of mydriasis is stressed. In the general treatment sod.salicyl. is recommended, one grain to every 1lb. of body weight per diem in divided doses and combined with sod.bicarb.

In the non-specific therapy diphtheria antitoxin is advised after a preliminary determination of the patient's sensitivity by the injection of 0·1 c.c., 0·2 c.c., 0·5 c.c., 1 c.c., 2 c.c. and 5 c.c. intramuscularly at 15 minute intervals. 20,000 units intra-muscularly every day for one week are recommended and if the case is advanced and improvement is insufficient after seven days this course should be repeated and then 20,000 units of diphtheria antitoxin administered once a week. Verhoeff claims that 66 per cent. of cases treated early by this method terminate favourably. For specific therapy the author recommends desensitization with uveal pigment.

H. B. STALLARD.

(3) **Bothman, L. and Rolf, D. E. (Chicago). — The Kayser-Fleischer ring in Wilson's disease and microcephaly.** *Amer.Jl. Ophthal.*, Vol. XIX, p. 26, 1936.

(3) **Bothman and Rolf** review the literature of Wilson's disease, a rare neurological condition of unknown aetiology in which the train of clinical features are degenerative changes,

probably lipoidal in character, in the corpus striatum, putamen, globus pallidus and lenticular nucleus, associated with the presence of a golden brown and bluish green ring in the cornea, a sunflower copper cataract and multi-lobular cirrhosis of the liver.

The Kayser-Fleischer ring in the cornea consists of pigment granules situated in Descemet's membrane at the limbus and extending from 1-2·5 mm. in width towards the centre of the cornea. The ring is wider above and below than nasally and temporally in many cases. Adjacent to the limbus it is golden brown and its central part is bluish green, fading gradually into the cornea. In some cases it is not a complete ring being broken or forming a semicircle.

The anterior part of the lens presents a sunflower cataract of grey-blue colour, the centre being lighter than the periphery. Night blindness has been noted in association with Wilson's disease and Fleischer and Metzger have noted well defined greyish-white, round or oval spots in the periphery of the upper half of the retina.

The disease is familial and insidous in onset. It begins with tremors of the extremities having a constant rhythm and at the rate of 4-8 per second. The body and head are also affected but to a lesser degree. Tonic and clonic movements are occasionally present and the muscles display hypertonia. Unilateral and bilateral contractures and inability to maintain balance occur in some cases. Dysarthria leading to anarthria, dribbling saliva, dysphagia, anorexia and a fixed grin are other clinical features. The disease is progressive and terminates fatally in 2-4 years.

The authors describe the clinical details of four cases under their care, two of which were brother and sister. The former was aged 15½ years and the latter aged eight years. Both showed the Kayser-Fleischer ring and are probably the youngest cases reported. The sister had microcephaly but as yet no evidence of extra-pyramidal disease. In none of the four cases reported by the authors was the liver enlarged.

H. B. STALLARD.

(4) **Charles, J. W. and Hayward Post (St. Louis).—Lipodystrophia progressiva with ocular complications.** *Amer. Jl. Ophthal.*, February, 1936.

(4) **Charles and Hayward Post** describe the case of a female who between the age of 26 and 46 years suffered a progressive and extensive loss of fat from the orbits, face, neck, breasts and down to the waist. The extremities were affected in a lesser degree. The globes sank back in the orbits and the lids were unsupported. Many cilia were absent from the lids of the right eye and all from the left eye.

A corneal ulcer developed in the right eye and there was evidence of choroidal atrophy around the optic disc and optic atrophy in this eye. The left cornea became opaque and vascularised. The conjunctivae became passively congested and the sclera resembled marbles. Degeneration and loss of fat continued and eventually the patient became blind.

The authors suggest that this condition may be due to an abiotrophy. Other views concerning hyperthyroidism and neurotrophic disorders are discussed.

H. B. STALLARD.

(5) **Jensen, V. A. (Copenhagen).—Clinical studies of tributary thrombosis in the central retinal vein.** *Acta Ophthal.*, Supplementum X.

(5) **Jensen** introduces his subject by an ophthalmoscopic study of the distribution of retinal vessels in the normal eyeground. Drawing on 50 patients (100 eyes) he shows that there is a general symmetry as regards the number of crossings on the two sides, and that the upper temporal quadrant contains the largest number of these, and the upper nasal quadrant the least. He further found that in 70 per cent. of cases the artery lies in front of the vein. Other points of interest that emerged were that the inferior nasal vein is missing in 22 per cent. of the cases, being replaced by a branch of the inferior temporal vein; that the superior temporal artery in 38 per cent. of cases gives off a large, almost horizontal branch issuing from near the papillary border and passing across the macula; that in 73 per cent. of cases macular arteries supply the macular area in addition to the twigs it receives from the temporal artery, cilio-retinal arteries being present in eight per cent.

His clinical studies concerned 54 patients with ages ranging from 43 to 74 years of age all showing thrombosis, not of the central vein, but of a branch; there were 61 obstructions, six patients presenting bilateral thrombosis and one having two thromboses in the same eye. In 75 per cent. of cases the reduction of visual acuity takes place suddenly and in about half of these cases vision does not exceed 6/60. In 56 per cent. the upper temporal vein is obstructed, and in 36 per cent. the lower temporal vein; obstruction on the nasal side is thus distinctly rare. What is of special interest is the author's observations on retinitis circinata; after an interval of six months he noted this in 19 of his cases. Another point of significance is the pigmentation that takes place in the macular area making the ultimate prognosis none too satisfactory. The author advances proof that extensive sclerotic changes take place both in the obstructed vein and in the corresponding artery—of a far greater degree than the original

sclerosis which may have precipitated the thrombosis. In contrast to complete venous thrombosis, partial obstruction does not seem to bring on glaucoma, only one case having developed glaucoma, and this after an interval of seven years. From the aetiological aspect nothing new emerged from this study. In 92 per cent. of cases an increased blood pressure was found; nephrosclerosis was present in three cases; the cause of death in 14 cases was of a vascular character, but such accidents occur at such variable times that the author does not deem it justifiable to ascribe to the ocular affection any importance with regard to the prognosis of life.

ARNOLD SORSBY.

(6) **Osvaldo (Gorizia).—Retinal tonoscopy and headaches. (La tonoscopia. (La tonoscopia retinica nelle cefalee).** *Rass. Ital. d'Ottal.*, August, 1935.

(6) Since Bailliart suggested his method of investigating the pressure in the arteria centralis retinae, the importance of the isolated increase of the pressure in this artery has been much discussed; normally the pressure in the central artery is about half that in the brachial; sometimes it is considerably more and then it generally indicates increased intracranial pressure. The sign, therefore, may be helpful in the diagnosis of the cause of headache.

**Osvaldo** quotes two cases in which persistent headache was accompanied by increase in the pressure in the central artery as revealed by Bailliart's method. Lumbar puncture in one case was followed by permanent relief; in the second the relief though great, was temporarily only. In both, the pressure of the fluid extracted was much above normal. The headache was presumably due to the raised intracranial pressure, for which no cause was found.

HAROLD GRIMSDALE.

(7) **Casini (Pisa).—Retinitis pigmentosa and vitamin defect. (Sulle retinosi pigmentarie ed avitaminosi).** *Arch. di Ottal.*, November, 1935.

(7) **Casini** gives notes of three cases of retinitis pigmentosa. Two, brothers, showed occipital meningocele. The elder brother also had xeroderma pigmentosa.

The third case had a marked deficiency of cholesterin. The author increased the cholesterin count in several ways and noted some slight improvement both in the extent of the visual field and the visual acuity. He thinks this may be attributed to the beneficial action of the cholesterin on the nervous elements of the

retina. In the brothers' cases he administered vitamin C, judging that the xeroderma might be connected with vitamin deficiency. There was no improvement in any respect.

HAROLD GRIMSDALE.

(8) **Borsellino (Palermo).—Bilateral microphthalmos and macular degeneration in three brothers. (Microftalmo bilaterale familiare associato a degenerazione maculare congenita).** *Rass. Ital. d'Ottal.*, March-April, 1935.

(8) From the union of apparently perfectly healthy parents, four children were born, all of whom were blind; one died in infancy and the exact condition is not known; the three living were all microphthalmic, with complete blindness; in the eldest cataract prevented any view of the fundus; in the others there was optic atrophy and a large coloboma at the macula. Borsellino thinks that these cases may be allied to the familial retinal degeneration reported by other observers.

HAROLD GRIMSDALE.

(9) **Sala and Borsellino (Palermo).—The eye in chronic copper poisoning. (Il comportamento dell'occhio nella intossicazione cronica da rame).** *Boll. d'Ocul.*, March, 1936.

(9) One of the authors observed a peculiar and characteristic form of opacity in the lens of one eye, following local copper poisoning. They wished to see whether chronic general poisoning would bring on similar opacities; to this end they injected copper sulphate in dilute solution into rabbits which survived for several months without showing any opacity of the lenses; the authors conclude that the "sunflower" cataract (catarrata a girasole) observed sometimes in pseudosclerotics, which has been attributed by some to the retention of copper salts in these subjects, cannot be due to this.

HAROLD GRIMSDALE.

(10) **Duc (Turin).—Chalcosis. (Sulla] calcosis oculare).** *Rass. Ital. d'Ottal.*, March-April, 1936.

(10) Duc has experimented on rabbits, placing fragments of copper wire in the anterior chamber and the vitreous, with the intention of preserving the animals alive for a long time and examining the eyes. Unfortunately an epidemic broke out so that none of the animals survived longer than two-and-a-half months. He has noted that copper is comparatively little irritating to the eye, and that in no case, except when the lens had been injured during the introduction of the foreign body, was there any change in the lens; this confirms the observations of many experimenters

that the typical cataract follows only after the long retention of the metal. The author observed occasionally the presence of granules of copper in Descemet's membrane near the iris angle and also under the corneal epithelium in the same region.

HAROLD GRIMSDALE.

(11) **Seidel, E. (Jena).—Fundamentals in cataract extraction. (Grundsäzliches zur Staroperation).** *Arch. f. Ophthal.*, Vol. CXXXV, p. 159.

(11) **Seidel** holds that the best way to minimise inflammation after cataract extraction is (1) to reduce as far as possible the risk of infection from without by introducing into the eye the fewest possible instruments at the operation, and (2) to reduce operative trauma and irritation by leaving the iris intact (*i.e.*, no iridectomy or iridotomy), which also avoids a cut surface in the iris that might facilitate the entry of any germs carried in by the instruments from the conjunctiva.

He dissents from the view that iritis is set up by lens matter left behind, and therefore does not insert any instrument to remove it.

In preparation for the operation maximal dilatation of the pupil (with paralysis of the sphincter) and efficient anaesthesia with akinesia are most important. The former is obtained by the use of 1 per cent. atropine half to one hour before the operation, while for the latter 10 per cent. cocaine is instilled five or six times at one minute intervals with two drops of adrenalin.

A large incision, over 2/5 of the circumference of the cornea, is made at the limbus; this ensures easy delivery of the lens—cortex together with the nucleus—and avoids injury to the iris. A conjunctival flap is cut and turned over on the cornea, thus providing a sterile area of episclera for the capsule forceps and spatula as they are guided into the anterior chamber. With the capsule forceps the largest possible piece of capsule is removed; this facilitates the expression of the cortex with the nucleus, avoids a dense after-cataract, and allows any lens matter left behind to be completely absorbed. After extraction of the lens it usually suffices to introduce the spatula only *once* to secure complete reposition of the iris, and in order to prevent its prolapse in the first 24 hours a drop of 1 per cent. eserine is instilled immediately after the operation.

The author claims that by this method the whole operation is shortened and made easier, the danger of infection is diminished and the period of convalescence is reduced. In stating his objections to the intra-capsular operation he emphasises the fact that by this technique he has obtained equally good results in high myopes, diabetics, and in immature cataract.

THOS. SNOWBALL.

## BOOK NOTICES

**The Extra-Ocular Muscles.** By LUTHER C. PETER, A.M., M.D., Sc.D. (Pennsylvania). Second edition, thoroughly revised. Illustrated with 136 engravings and 5 coloured plates. Pp. 351. London: Henry Kimpton. 1936. Price, 21s. net.

This book constitutes a notable addition to ophthalmological literature and gives a remarkably complete account of what is known about the extra-ocular muscles. The author being an ophthalmic surgeon of wide experience, has not been content merely to give a resumé of other men's work, but has included a great deal of his own.

After an introductory chapter on anatomy and physiology, there follow sections on heterophoria, concomitant squint, paralytic squint, surgical technique, and finally nystagmus. Each of these is well written and gives clear explanations of matters not always found in ordinary text books, and yet of considerable importance. One feels in reading them that in a few places the phraseology might be altered; thus in discussing Listing's law, the author writes about " false " torsion occurring when the eyes are carried into oblique positions. Such torsion is surely the antithesis of " false " and would be better described as physiological. Words such as " synergistic " instead of synergic, " monolateral " instead of unilateral, " power " instead of force, crop up now and again, together with a fair number of split infinitives; but these make no difference to the general excellence of the book, but perhaps detract a little from its literary polish. Though most of the tests are adequately described, omissions occur here and there. Thus in measuring the angle of squint by Hirschberg's method the distance between the light and the patient's eye is not mentioned, and in describing the measurement of hyperphoria the reader is not warned of the possibility of error when it is taken for one eye only. In a few cases quite a substantial difference is obtained according to whether the Maddox rod is placed in front of the right or the left eye, particularly if " double hyperphoria " be present.

The treatment of the various phorias is well described, and the author's account of his method of prism training for esophoria should be particularly valuable to ophthalmic surgeons. With regard to esophoria, it is interesting to note that in highly strung patients the author has repeatedly been able to convert an aggravated form into one of moderate degree by simply cutting off a vicious habit of using tea, coffee or tobacco.

The chapter devoted to surgical technique is of great interest, particularly that portion of it which deals with operations for the

relief of paralytic strabismus, *e.g.* tendon transplantation and division of yoke muscles. Surgical measures are not entirely relegated to this section however, and receive adequate consideration after the description of each type of squint. In his preface the author states " that satisfactory results are only obtained by studying the special needs of each patient and by selecting the operation or surgical procedures which the case requires." The fact that no one specific operation is applicable to all cases is well shown throughout the chapters on concomitant and paralytic squint. Non-operative treatment by orthoptic measures is described, but the importance of detecting abnormal binocular projection and abnormal retinal correspondence is perhaps not sufficiently emphasised, in view of the rôle these conditions play in bringing about a recurrence of squint after the eyes have been put straight by surgical means.

It is a poor compliment to an author of standing to lavish his work with unstinted praise and it is for this reason that we have ventured to make a few criticisms. Mr. Luther Peter has attempted a difficult task in compiling a treatise on the extra-ocular muscles and no one who reads it can fail to congratulate him on the success of his effort.

## CORRESPONDENCE

*To the Editors of* THE BRITISH JOURNAL OF OPHTHALMOLOGY.

SIRS,—We wish to refer to the article by Mr. F. A. Williamson-Noble which appeared in your Journal recently in connection with bifocal lenses.

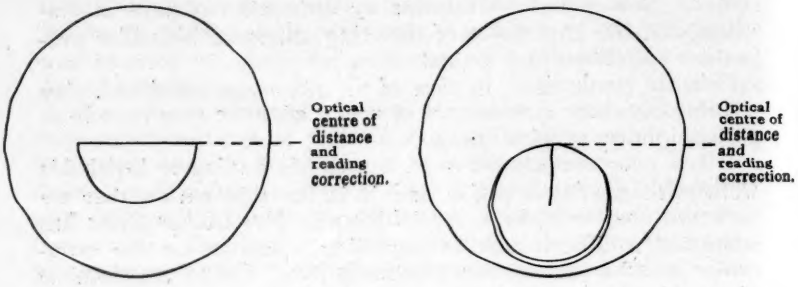
Many years ago the United Kingdom Optical Co., Ltd., introduced to the trade two ranges of bifocals which accomplish the object of Mr. F. A. Williamson-Noble in exactly the same way.

The first was " Univis " shape " C " which has the optical centre of the R.P. on the straight top line and the optical centre of the distance lens should be worked on the line or say up to 1½ mm. above. If these conditions are present there is no displacement of objects. This lens has the added advantages of having a large lateral field immediately upon entering the R.P., the lower edge of the R.P. has less prismatic effect, and there is a distance portion below the R.P. which it is obvious is easier for the wearer to see the stairs through because they are in focus.

Prism controlled fused bifocals were the second type. This is a round segment type in which any amount of prism, base in any

direction may be added to the R.P. only, although it is recommended not to use more than 3$^{\Delta}$ in each eye owing to the increased thickness.

The position of the segment and the amount of prism added may be such that the distance optical centre and the optical centre of the R.P. are at the edge of the segment. Again, this lens may be used to produce a single vision lens with two optical centres at any given point.




Two rather rough sketches illustrating the bifocals referred to are attached and we hope these will make our points quite clear.

Yours faithfully,

*for United Kingdom Optical Co., Ltd.,*

E. E. SNOW,
*Secretary.*

MILL HILL, LONDON, N.W.7
*September 8, 1936.*

## OBITUARY

### W. E. CANT

WE regret to record the death of William Edmund Cant at his home, Lexden, Colchester on August 17, 1936, at the great age of 92. Mr. Cant was a scholar of Colchester Royal Grammar School and entered St. George's Hospital in 1863, the same year as P. H. Mules of glass globe in the sclerotic fame. Qualifying M.R.C.S. in 1868, Cant was house surgeon at St. George's in 1869 and proceeded F.R.C.S. in 1874, and M.D. Dunelm, 1885. From 1878 to

1885 he was surgeon in charge of the Government Lock Hospitals, as well as assistant surgeon to the Central London Ophthalmic Hospital.

The great work of his life was done in Jerusalem, where for a quarter of a century he was surgeon to the British Ophthalmic Hospital which is under the control of the historic order of St. John of Jerusalem. When Cant took up his work there in 1886 the conditions were very primitive. The magnificent hospital which now exists and has done so much good work in Palestine, is a lasting memorial to his enthusiasm and perserverance. It was only fitting that he should have been made a Knight of Grace of the order of St. John of Jerusalem.

On retiring from active work he went to live at his old home in Lexden.

He did not write much but a paper of his in the Transactions of the Ophthalmological Society in 1904 on an operation for Trichiasis-entropion is classical. "Cant's Cuts," described in this paper, increase the efficacy of Streatfeild's operation on entropion in inveterate cases and are of importance.

Dr. T. Harrison Butler writes:—

I worked under Cant for four years at Jerusalem.

He was a member of the well-known rose growing Cant family of Colchester. He was married to Mary Cant, and had no children. His widow survives him.

His amusements were yachting as a young man, and I think riding. He was a good musician and spent much of his spare time playing the piano.

Cant was trained at Moorfields under Nettleship, for whom he had a most intense admiration. One of his commonest phrases was:—"Nettleship used to say . . . . ."

He was a sound but not a brilliant operator. Naturally in Jerusalem the results of trachoma were universal, and the operations for trichiasis and entropion took up many hours of the week. In my time we used to operate upon three mornings a week, and see out-patients on the other three. We had to make all our solutions of cocaine and sharpen our scalpels. Cataract knives and such like went back to Weiss in a travelling case with a glass top so that the Customs could see what it contained without handling the contents. All the trichiasis cases had a general anaesthetic, ether, administered by the Arab dispenser. We used the Clover apparatus, and had difficulty in preserving the rubber bags. We never had any trouble with general anaesthetics. Cant modified Snellen's operation and used it exclusively. His

valuable modification consisted in substituting the excision of a square bit of tarsal plate instead of the usual triangular strip. In bad cases he did an internal and external canthoplasty. I could never persuade him to perform van Milligen's operation which in the majority of cases is by far the best operation. For ptosis he used to perform Panas' operation. All cataracts were extracted by the orthodox method, combined operation, and apart from an occasional panophthalmitis, the results were excellent. Irido-cyclitis was practically unknown. In my time iridectomy was the only operation for glaucoma, but as the majority of the cases were seen when the condition was far advanced it did not much matter what operation was done. An enormous number of optical iridectomies were performed with very poor results. We were pleased if the patient could see to get about. There is a wonderful field for corneal grafting at the British Ophthalmic Hospital. Practically all the patients suffered from trachoma, but it never made the slightest difference to the results of intra-ocular operations.

In the busy season we used to see about 100 new patients a morning, Cant saw the new ones on two days a week while I saw the old ones. On the third day we reversed our rôles. This meant that the assistant surgeon was responsible for one third of the new cases. The majority of the work was associated with external diseases, mainly keratitis and conjunctivitis, with the ubiquitous trachoma. We did not do much refraction, and retinoscopy and ophthalmoscopy was all done with the aid of a paraffin lamp, and a most useful illumination it is too.

During the summer months the onset of the epidemic of acute muco-purulent conjunctivitis made the work of the out-patient department very strenuous, and even dangerous. The greatest care had to be taken to avoid self infection. I saw some very tragic cases among the missionaries caused by neglect of these precautions.

Cant was a most conservative man and opposed to any innovation. He stuck to silver nitrate in 1 per cent. solution and never used the newer preparations of silver. He did not recognise the existence of spring catarrh, a very common condition in Jerusalem. He treated trachoma on the conventional lines which even now seem to be the best, rubbing with either blue-stone, or with the copper-alum stick. Cant recognised that few eyes will tolerate long continued treatment with pure copper sulphate. The patients took home the ordinary yellow oxide of mercury. Excision of the tarsus was never done in my time.

Cant was a reserved, taciturn man, but he was thoroughly conscientious with a keen sense of duty. His life work was the development of the British Ophthalmic Hospital at Jerusalem.

He had a passion for building, and the gradual enlargement of the original small and quite inadequate premises near the railway station to the fine buildings he left behind him gave him immense pleasure. His whole life's interest was the Hospital and its work, and no man could wish for a fitter monument than the present Hospital. For many years Mrs. Cant acted as matron and housekeeper of the institution, not at all an easy job in an Eastern Country. The patients came from all over Palestine, and from beyond the Jordan. Some had several weeks journey on a camel coming from far south from the Sinai District. They had heard of the fame of " The Father of Hairs " which being translated means the " curer of trichiasis." The work of the Hospital had to be carried out in several languages: Arabic, " Yiddish," Greek, Russian, and many others. A smattering of many of these tongues was all in the day's work.

Cant may be forgotten at home, but for many years the memory of the " Hakeem " will be green among the Arabs in and round Palestine.

## NOTES

**The Decennial Index**

THE index for Volumes XI—XX is in preparation and will be issued to subscribers early in the New Year.

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**Clinical Ophthalmology at the Hôtel Dieu**

PROFESSOR TERRIEN announces the customary annual post-graduate course in ophthalmic surgery in October. The course will be composed of twelve sessions and a certificate will be granted on completion. Further particulars can be obtained from Professor Terrien.

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**North of England Ophthalmological Society. Annual Lectures**

THE Annual Lectures under the auspices of the North of England Ophthalmological Society will be delivered next year by Professor A. J. Ballantyne of Glasgow. His subjects will be:—

(1) " Modern Methods in Ophthalmoscopy " at Sheffield University on Friday, January 29, 1937 at 4.30.

(2) " The evolution of Retinal Vascular Disease " at the University of Manchester on Monday, February 1, 1937 at 4.30.

Tea will be served at 4 o'clock. The Lectures are open to all members of the Medical Profession.

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**Bureau of Human Heredity**

THE object of this Bureau is collection on as wide a scale as possible of material dealing with human Genetics. Later, the tasks of analysis of material and distribution of the information available will be added.

The Bureau is directed by a Council representing medical and scientific bodies in Great Britain. It is affiliated to the International Human Heredity Committee, which ensures co-operation in all areas where research is proceeding.

The Council would be grateful to receive all available material from Institutions and individuals, furnishing well-authenticated data on the transmission of human traits whatever these may be. Pedigrees are particularly desired; twin studies and statistical researches are also relevant. As research workers and others who send in material may in some cases wish to retain the sole right of publication (or copyright) those who so desire are asked to accompany their material with a statement to that effect.

Material should be given with all available details in regard to source, diagnostic symptoms and the name and address of the person or persons who vouch for accuracy. All such details will be regarded as strictly confidential.

Reprints of published work would be most acceptable. Further, many authors when publishing material may also have collected a number of pedigrees which they have been unable to reproduce in detail. It is the object of the Council that such records, by being included in the Clearing House, should not be lost.

Those wishing for a copy of the Standard International Pedigree Symbols may obtain one from the office.

Announcements in regard to the services undertaken by the Bureau will be published from time to time.

*Chairman*: R. Ruggles Gates. *Executive Committee*: R. A. Fisher, J. B. S. Haldane, E. A. Cockayne, J. A. Fraser Roberts, L. E. Halsey (Hon. Treasurer), C. B. S. Hodson (Hon. Gen. Secretary).

115, GOWER STREET,
LONDON, W.C.1

## FUTURE ARRANGEMENTS

### 1936

*October* 6.—Midland Ophthalmological Society, at Birmingham Eye Hospital.

*October* 16.—North of England Ophthalmological Society, at Manchester.

*November* 6.—North of England Ophthalmological Society, at Bradford.

*December* 1.—Midland Ophthalmological Society, at Birmingham Eye Hospital.

*December* 4.—North of England Ophthalmological Society, at Leeds.

### 1937

*January* 29.—North of England Ophthalmological Society, at Sheffield.

*February* 1.—North of England Ophthalmological Society, at Manchester.

*February* 5.—North of England Ophthalmological Society, at Newcastle-on-Tyne.

*March* 5.—North of England Ophthalmological Society, at Liverpool.

*April* 9.—North of England Ophthalmological Society, at Sheffield.

## CONTEMPORARY OPHTHALMIC LITERATURE

### American Journal of Ophthalmology. *August, 1936.*

ALLEN and HOWARD. Lipemia retinalis.
THYGESON. An analysis of recent studies on the etiology of trachoma.
WHITE. The screen test and its applications.
DICKEY. Superior rectus fascia lata sling in the correction of ptosis.
LENZEN and GRADLE. The treatment of trachoma.
BROWN. Severe tuberculosis of the anterior segment of the eye.
ANDERSON. Scientific bases for selection of bifocal lenses.
THOMPSON and GALLARDO. The concentration of lysozyme in the tears in acute and chronic conjunctivitis.
HUGHES. Aniseikonia.

### Archives d'Ophtalmologie. *August, 1936.*

VELTER. The diagnosis of affections of the chiasma and sellar region.
FRANÇOIS. Marginal degeneration of the cornea.

### Klinische Monatsblätter für Augenheilkunde. *July, 1936.*

SOBANSKI. Treatment for tabetic optic atrophy.
GOERLITZ. Retinal detachment and pregnancy. Further experience of the operative treatment of retinal detachment.

BRONS. Cavernous angioma of the choroid.
MELANOWSKI. Contribution to the pathogenesis of sympathetic ophthalmitis. A case of primary intra-ocular melano-sarcoma as the origin of sympathetic ophthalmitis.
PILLAT. Detachment of the upper part of the vitreous.
GILBERT. The relation between fifth cranial nerve disease and intra-ocular operations.

*August, 1936.*

RÖNNE. The colloidometer.
ZIERING. On papillary and parapapillary conus heterotypicus.
BARTELS. Tumour of the hypophysis.
LENZ. Local treatment of eye disease with radium emanation.
STREIFF. The nature of intra-ocular and hallucinatory phenomena in intra-ocular pathological conditions.
NEDDEN. Inheritance of idiopathic retinal detachment.
BUNGE. Total colour blindness, hemeralopia, and tapeto-retinal degeneration in two children in the same family.
GOLDMANN. A simple instrument for exact localization of the hole in retinal detachment.

## Annali di Ottalmologia e Clinica Oculistica. *April, 1936.*

PALMIERI. Influence of intravenous injections of a hypertonic solution of sodium chloride on the intra-ocular tension.
MECCA. Retinitis pigmentosa. Clinical and experimental contribution to the aetiology and treatment.

*May, 1936.*

CASCIO and FRIEDMANN. Action of light on the amino-acid content of the retina.
BARATTA. Ocular lesions from lightning.
ANASTASI. Conjunctival lymphoma.
MECCA. Ocular complications in aleukaemic lymphadenosis.
VITO. The property of the curve which reproduces the behaviour of distance visual acuity in the principal meridia of the retina.

## Revista Oto-Neuro-Oftalmologica y de Cirugia Neurologica.

*July, 1936.*

PAVIA. Green spot in the fundus of the eye.
MATTOS. Familial syphilitic macular lesions.
PAVIA and IRIGOYEN. Macro-nodular tuberculous irido-cyclitis with dissemination to the rest of the eye.

*August, 1936.*

PAVIA. Green spot in the fundus of the eye.
VICTORIA and PAVIA. Fröhlich's syndrome with ocular disturbance.
PAVIA, FERRO and GALINDEZ. Phlyctenular kerato-conjunctivitis in an ordinary case of caseating and fibrosing tuberculous nodules.

## Revista Cubana de Oto-Neuro-Oftalmiatria. *May-June, 1936.*

AVALOS. My third observation on a case of severe bilateral uveitis, accompanied by deafness, baldness and whiteness of the hair.
ALONSO. Medico-surgical treatment of iridocyclitis of luetic origin.
BONA. Pathology of the iris and pupil in syphilis.
ESTEBAN. A cause of failure of dacryocystorhinostomy.